

WHAT IS CLAIMED IS:

1. A pressure generating mechanism comprising:
a plate member made of a piezoelectric material;
first electrodes disposed at the plate member at
intervals in a plane direction of the plate member; and
second electrodes opposite to the first electrodes
in a thickness direction of the plate member
substantially perpendicular to the plane direction of the
plate member,
the plate member comprising:
active portions formed in the plate member at
intervals in the plane direction of the plate member,
each of the active portions being sandwiched by the
corresponding first and second electrodes and deformable
in the thickness direction of the plate member; and
a microcrack region formed in the plate member
between neighboring active portions, the microcrack
region including therein a large number of microcracks.
2. The pressure generating mechanism according to
claim 1, wherein each of the active portions is polarized
in the thickness direction of the plate member.
3. The pressure generating mechanism according to

claim 2, wherein when a driving electric field is applied to an active portion sandwiched by the corresponding first and second electrodes, the active portion is deformed in the thickness direction of the plate member and the deformation of the active portion is prevented from propagating to the neighboring active portion by the microcrack region.

4. The pressure generating mechanism according to claim 1, wherein the second electrodes are connected to a common wire.

5. The pressure generating mechanism according to claim 1, wherein the microcrack region is formed through the whole thickness of the plate member.

6. The pressure generating mechanism according to claim 1, wherein the microcrack region has the same thickness as the active portions.

7. The pressure generating mechanism according to claim 1, wherein the microcrack region is formed over the whole length of the active portions to isolate the neighboring active portions from each other.

8. The pressure generating mechanism according to claim 7, wherein each active portion is sandwiched by neighboring microcrack regions.

9. The pressure generating mechanism according to claim 8, wherein the neighboring microcrack regions are formed continuously with each other to surround the corresponding active portion.

10. The pressure generating mechanism according to claim 1, wherein the mechanism further comprises a third electrode and a fourth electrode disposed between the neighboring active portions, opposite to each other in the thickness direction of the plate member, and the microcrack region is formed in a region sandwiched by the third and fourth electrodes.

11. The pressure generating mechanism according to claim 1, wherein the mechanism further comprises a third electrode disposed between the neighboring active portions, one of the first and second electrodes is elongated to a point between the neighboring active portions to be opposed to the third electrode in the

thickness direction of the plate member, and the microcrack region is formed in a region sandwiched by the third electrode and the elongated electrode.

12. The pressure generating mechanism according to claim 10, wherein the plate member comprises a plurality of piezoelectric plates put in layers, the first and second electrodes are disposed alternately between the piezoelectric plates, and the third and fourth electrodes are disposed alternately between the piezoelectric plates.

13. The pressure generating mechanism according to claim 12, wherein the first and fourth electrodes are disposed on one of the piezoelectric plates, and the second and third electrodes are disposed on another one of piezoelectric plates.

14. The pressure generating mechanism according to claim 11, wherein the plate member comprises a plurality of piezoelectric plates put in layers, the first and second electrodes are disposed alternately between the piezoelectric plates, the third electrode is disposed on one of the piezoelectric plates, and the microcrack region is formed in a region sandwiched by the third

electrode and one of the first and second electrodes elongated to the point between the active portions.

15. The pressure generating mechanism according to claim 14, wherein at least two piezoelectric plates are sandwiched by the third electrode and the elongated electrode.

16. A liquid droplet ejection device comprising:
a pressure generating mechanism; and
a wall member including partition walls defining liquid chambers,
the pressure generating mechanism comprising:
a plate member made of a piezoelectric material;
first electrodes disposed at the plate member at intervals in a plane direction of the plate member; and
second electrodes opposite to the first electrodes in a thickness direction of the plate member substantially perpendicular to the plane direction of the plate member,
the plate member comprising:
active portions formed in the plate member at intervals in the plane direction of the plate member, each of the active portions being sandwiched by the

corresponding first and second electrodes and deformable in the thickness direction of the plate member; and

a microcrack region formed in the plate member between neighboring active portions, the microcrack region including therein a large number of microcracks,

the plate member being fixed to the wall member so that each of the active portions corresponds to the corresponding liquid chamber and the microcrack region corresponds to the corresponding partition wall.

17. A manufacturing method of a pressure generating mechanism, the method comprising:

an electrode forming step for forming a plurality of first electrodes at a plate member made of a piezoelectric material at intervals in a plane direction of the plate member, and forming a plurality of second electrodes so as to be opposed to the respective first electrodes in a thickness direction of the plate member substantially perpendicular to the plane direction of the plate member;

a polarizing step for applying a polarizing electric field between the first and second electrodes to polarize the plate member, and thereby forming a plurality of active portions in regions sandwiched by the

first and second electrodes, each of the active portions being deformable in the thickness direction of the plate member; and

a microcrack forming step for forming microcracks in the plate member between neighboring active portions.

18. The manufacturing method according to claim 17, wherein the plate member is made by putting a plurality of piezoelectric plates in layers, and the first and second electrodes are formed by screen printing with a conductive paste on different piezoelectric plates, respectively, in the electrode forming step.

19. The manufacturing method according to claim 17, wherein a third electrode is formed at the plate member, between neighboring first electrodes, and a fourth electrode is formed to be opposed to the third electrode in the thickness direction of the plate member, in the electrode forming step, and

an electric field more intense than the polarizing electric field is applied between the third and fourth electrodes to form microcracks in the plate member between the neighboring active portions, in the microcrack forming step.

20. The manufacturing method according to claim 19, wherein the electric field to be applied between the third and fourth electrodes in the microcrack forming step exceeds a breakdown limit of the plate member.

21. The manufacturing method according to claim 17, wherein one of the first and second electrodes is formed to be elongated to a point between the neighboring active portions, a third electrode is formed at the plate member between neighboring first electrodes so as to be opposed to the elongated one of the first and second electrodes in the thickness direction of the plate member, in the electrode forming step, and

an electric field more intense than the polarizing electric field is applied between the third and elongated electrodes to form microcracks in the plate member between the neighboring active portions, in the microcrack forming step.

22. The manufacturing method according to claim 17, wherein a region sandwiched by the neighboring active portions is irradiated with a laser beam to form the microcracks in the plate member, in the microcrack

forming step.

23. The manufacturing method according to claim 22, wherein a laser source used in the microcrack forming step is YAG.

24. The manufacturing method according to claim 17, wherein a region sandwiched by the neighboring active portions is pressed with an indenter to form the microcracks in the plate member, in the microcrack forming step.

25. The manufacturing method according to claim 24, wherein the indenter used in the microcrack forming step is a diamond indenter.

26. The manufacturing method according to claim 25, wherein the indenter used in the microcrack forming step is a Vickers indenter.